

the frequency spectrum, and it would be a waste of Commission resources to propose use of this spectrum when, in fact, it simply cannot accommodate new users.<sup>12</sup>

## 2. WTCI's 6 GHz Channelization Proposal

WTCI proposes, as does AT&T, that the existing 6 GHz frequency channelization plans, with 29.652 MHz bandwidth channels rather than the 30 MHz channels proposed by the Further Notice, be retained and included in the revised Rules. A number of parties filing Comments, e.g., Comsearch, NSMA and see particularly AT&T's Comments, Appendix B, (p. 1), have stressed that changing the channelization of existing 6 GHz microwave systems would be extremely burdensome and costly to common carriers in that band and would serve no useful purpose. See also WTCI's attached Engineering Statement. In fact, Alcatel in a communication to all parties dated January 12, 1993, has advised that the industry response to the proposed 30 MHz channel spacing in the Further Notice has been "universally negative" and that Alcatel will submit a revised 6 GHz frequency plan based on traditionally 29.65 MHz channel spacing in its forthcoming Reply Comments.<sup>13</sup>

WTCI proposes that a small number of narrow band channels up to 400 kHz be allocated in the band edges of the 6 GHz band. With the

---

<sup>12</sup> To the extent that the Commission is intent on forcing a change, WTCI supports the proposal by MCI that the Commission add six 40 MHz channels in the 4 GHz band. Such a channelization plan would allow common carriers such as WTCI to support SONET and other new telephony technologies in this band.

<sup>13</sup> WTCI submits that to the extent Alcatel's Reply Comments fundamentally alter the proposal on which the Commission based its Further Notice, the Commission should put the revised Alcatel proposal out for further comment. Otherwise, parties may be denied the opportunity to address the new issues raised by Alcatel, which may raise significant Administrative Procedure Act questions.

exception of these channels, the 6 GHz band should not be divided into narrow bandwidth channels of less than 10 MHz, as the allocation of such narrower channels would effectively block an entire broad band channel and result in spectrum inefficiencies. WTCI supports the limited addition of 5 MHz and 10 MHz bandwidths proposed by AT&T (Comments, Appendix B) if the government bands referenced above do not become available for non-government users, recognizing that in that event limited portions of the 6 GHz band should be made available for co-primary users.

Considering the importance and heavy use of the 6 GHz band by common carriers, WTCI again recommends that the revised Rules provide that the 6 GHz private operational fixed band with its substantial number of narrow band channels be fully utilized before the 5 MHz and 10 MHz narrow band channels, if such are allocated, are used in the common carrier 6 GHz band.

### 3. WTCI's 11 GHz Channelization Proposal

As proposed by AT&T, NSMA and others, WTCI recommends that the current industry standard DE/JP frequency plans with its 530 MHz separations be retained and incorporated in the Rules rather than the proposed plan with its 500 MHz separation. The introduction of the proposed new 11 GHz plan would be particularly incompatible with the existing 11 GHz systems, resulting in spectrum inefficiency especially in attempting to clear narrow band channels. Any new narrow band frequency plan at 11 GHz must be developed on the basis of existing wide band frequency plans.

WTCI strongly recommends that 40 MHz channel bandwidths in the 11 GHz band be retained. The new equipment utilizing 40 MHz bandwidth channels is compatible with many new communications services (e.g. SONET and others). Technology being developed may allow for six DS-3 channels on a 40 MHz channel bandwidth, which will be extremely frequency efficient, and this new technology using 512 QAM is not compatible with the narrower 30 MHz bandwidths proposed in the Further Notice.<sup>14</sup>

WTCI's position is that narrow band channels included in the 11 GHz band must be compatible with 40 MHz bandwidth channels, as proposed by AT&T (Appendix C). WTCI further submits that the 11 GHz frequencies should be the last ones made available to displaced 2 GHz users after all of the options discussed above have been exhausted.

#### **IV. EXISTING FREQUENCY AND CHANNELIZATION PLANS OF COMMON CARRIER SYSTEMS OPERATING IN THE 4, 6 AND 11 GHz BANDS MUST BE GRANDFATHERED**

As indicated previously, the frequency plans for the common carrier bands which are adopted pursuant to this proceeding should minimize as much as possible the difference between systems operating under the old regime and those operating under the new frequency plans in the revised Rules. Thus, the Commission's goal in this proceeding should be to adopt frequency plans that are as compatible as possible with existing frequency plans and channelizations, and which at the

---

<sup>14</sup> As discussed above, the cost of changing from 40 MHz to 30 MHz channels would be over \$100,000 per microwave site, since the change requires installation of new IF equipment. There is no rational basis for placing this economic burden on microwave common carriers.

same time provide adequate capacity, both narrow band and otherwise, for those migrating from the 2 GHz band to provide frequency spectrum for the new and emerging technologies. Of course, regardless of the degree of harmony between the existing and newly promulgated frequency regimes, grandfathering must be provided for and the provisions thereof must be adequately set forth in the revised Rules.

While the Commission acknowledged in paragraph 32 of the Further Notice that “the expansion of existing microwave system should be allowed under current channelization plans without waiver”, the proposed Rule changes in Appendix A to the Further Notice did not contain any specific grandfathering provisions. As in its Comments, WTCI proposes that a footnote or subsection on grandfathering be added to Section 21.701 of the Rules as follows:<sup>15</sup>

Existing frequency and channelization plans of common carrier systems operating in the 4, 6 and 11 GHz bands on [the effective date of the revised Rules] are grandfathered, and new channels may be added to those systems, and those systems may be extended pursuant to such plans and channelizations, notwithstanding the frequency and channelization plans and related provisions set forth in the Rules.

---

<sup>15</sup> Note: This proposed wording is slightly expanded beyond that set forth in WTCI’s Comments (and accompanying footnote) to state clearly that system extensions are included in the grandfathering provision.

**A. Absent Grandfathering, Severe Intra-System Interference Will Occur in Future Expansion by Common Carriers**

It is absolutely critical that the new rules not only grandfather existing site licenses, but future channels added to those sites and extensions of those routes. The example provided in the attached Engineering Statement bears this out. New channels added to existing routes must follow the prior channelization plan, or severe intra-system interference will occur. Similarly, when a route is extended, it must also abide by the same channelization plan, or similar disastrous intra-system interference will result. Therefore, WTCI urges the Commission to adopt the language quoted above to ensure that existing facilities can continue to operate and expand in a rational fashion.

**B. Frequencies for Future Growth Must be Reserved for a Minimum of Five Years**

Channels for future growth, that is channels of 10 MHz or greater bandwidths, must be reserved for a period of at least five years. Microwave routes are expensive to construct, particularly considering the planning and local zoning and environmental issues that are often involved, and these total costs of construction must be amortized over a reasonable period of time. In most cases, especially considering the capacity of existing equipment and channels, the growth of traffic on the microwave system occurs over a period of time exceeding in many cases five years. Furthermore, the public interest in spectrum efficiency and reasonably priced communications services would not be served by Rules

that would inhibit if not prevent the full channel development of microwave systems.<sup>16</sup>

WTCI reiterates the position taken in its Comments that the reservation of channels for future growth should continue to be handled through the frequency coordination process, and that the Commission is correct in not proposing any rule changes related thereto in Appendix A of the Further Notice. The common carrier industry and frequency coordinators have worked together over the years in an exemplary fashion and have established procedures and conditions for the reservation of future growth channels that have enabled microwave systems to be constructed and expanded with a minimum of controversy and oversight by the Commission. The recommendation of NSMA for future growth plans, see Appendix C hereto, provides for regular six month renewal notifications for future growth channels, and there are six specific conditions which must be met for the reservation of future growth channels beyond the six month notification period. No one can dispute that the frequency coordination procedures of Section 21.100(d) of the Rules which provide for future growth channels have been an outstanding success and have been a singular example of industry self-regulation and savings in government administration.

The Commission's goal of promoting efficient and economical communications services nationwide would not be served by Rules governing the reservation of future wide band growth channels, and any

---

<sup>16</sup> Since the reservation of channels of limited bandwidths, i.e. 10 MHz or less, for five years or more would frustrate the full development of adjacent microwave routes, these narrow band channels should be reserved only for the period of the initial license or possibly a limited period thereafter.

time limits for such channels added to the Part 21.100 coordination Rules should provide for a reservation period of five years or more.

## V. GENERAL OPERATING PARAMETERS

If the Commission is intent on migrating users from the less technically demanding 2 GHz band up to the common carrier 4, 6 and 11 GHz bands, it must take precautions to ensure that such new users do not interfere with existing users. Part of their precaution must be that the new users abide strictly by the technical standards in these higher bands, including the C/I matrix used by the common carrier industry (as recommended by NSMA). Theoretical co-existence is one thing, actual interference is another. To avoid situations where all users are expending resources trying to track down and resolve interference, WTCI proposes that the Commission require new users in the 4, 6 and 11 GHz bands to follow the operating parameters described below.

### A. New Users Must Utilize the Part 21 Frequency Coordination Process, and Abide by Interference Standards in Part 21

In its Comments, WTCI agreed with the proposal in the Further Notice to require fixed microwave users operating in the common carrier bands to comply with the frequency coordination procedures of Section 21.100(d) of the Rules, and conversely to require those operating in the private carrier bands to comply with the interference study provisions of Section 94.63(a) of the Rules. However, the majority of those filing initial Comments in the proceeding recommended that all co-primary users in the bands above 2 GHz be required to comply with the frequency coordination procedures set forth in Part 21 of the Rules. WTCI agrees

that this would be the most practical and efficacious means of accomplishing frequency coordination among co-primary users in the subject frequency bands. WTCI in its Comments agreed with the proposal in the Further Notice that the frequency interference standards of Part 21 of the Rules would apply to those operating in the common carrier bands and conversely those set forth in Part 94 would apply to those operating in the private carrier bands.

Any additional interference standards that may be necessitated by co-primary spectrum use should be set and maintained by the industry. WTCI recommends and supports a joint industry committee, such as a NSMA/TIA committee, for the oversight and regulation of interference standards beyond those contained in the Rules.

**B. New Users Must Abide by Part 21 Antenna Performance Standards**

WTCI agrees with the majority of those filing initial Comments that the existing antenna performance standards need to be updated to reflect current technology. This will facilitate the co-primary use of the 4, 6 and 11 GHz and other frequency bands if that ultimately becomes necessary, and WTCI therefore requests the Commission to take the necessary steps to promulgate revised Rules for antenna performance standards. Specifically, WTCI recommends that the Commission adopt the antenna performance standards proposed by Comsearch in its initial Comments filed herein.

C. Automatic Transmitter Power Control

WTCI supports the NSMA recommendation on ATPC which utilizes three separate transmit powers, i.e., a maximum transmit power, a nominal transmit power, and a coordinated transmit power. WTCI recommends that these provisions governing the use of ATPC should be explicitly defined in the revised Part 21 and Part 94 Rules. Specifically, WTCI endorses the NSMA filing and proposed Rule on ATPC (See NSMA Comments, pp. 8-11 and Appendix A).

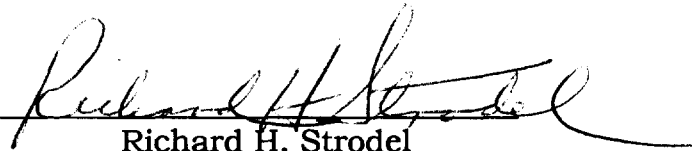
VI. CONCLUSION

WTCI supports the Commission's efforts in establishing frequency reserves for new technologies such as PCS. In doing so, however, it must be cognizant of the "domino effect" such decisions have, such as is now becoming clear by the responses to its Further Notice. The only way these fundamental changes can keep from becoming a zero sum game -- PCS wins and somebody must lose -- is for the FCC to increase the total available frequencies. As pointed out by other commenters and in these Reply Comments, available spectrum exists, and the FCC must make its highest priority the opening of the 1.71-1.85 and 3.6-3.7 GHz frequencies for non-government users. Otherwise, no overall gain to the public will result, and one must question whether a continuation of this docket truly is in the public interest.

WHEREFORE, the above premises considered, WTCI urges the Commission to adopt the priority plan and other proposals contained herein.

Respectfully submitted,

WESTERN TELE-COMMUNICATIONS, INC.

By:   
Richard H. Strodel  
James E. Dunstan  
Its Attorneys

HALEY, BADER & POTTS  
4350 North Fairfax Drive  
Suite 900  
Arlington, VA 22203-1633  
(703) 841-0606

January 27, 1993

## ENGINEERING STATEMENT

My name is Russell F. Johnson and I have been retained as an Engineering Consultant by Western Tele-Communications, Inc. (WTCI) for the purpose of analyzing the Further Notice of Proposed Rule Making in Docket No. 92-9 (Further Notice) and assisting WTCI in the formulation of its Reply Comments in response to the Further Notice. Until my retirement in 1991, I was Vice President-Engineering for WTCI and was responsible for the planning and construction of its microwave networks and its overall communications system, and since my retirement I have been a Consultant to WTCI and others for a number of projects. Before coming to WTCI in 1969, I was employed as a Microwave Engineer and Systems Manager by Mountain States Telephone and Telegraph Company from 1953 to 1969.

I hold an engineering degree from the University of Colorado, B.S.E., and I have participated in a number of IEEE and ICC committees and have attended their conferences from 1955 on and am still doing so. I was recently General Chairman for the International Conference on Communications (ICC-91) in Denver, Colorado in June, 1991. I was past Chairman of the Engineering Committee for the NCTA, and a member of the Technical Committee for Emergency Networks in the United States.

I have reviewed the Further Notice and the Comments filed by the various parties in the proceeding; I have also studied the Petition for Rule Makings filed by Alcatel and UTC. I have reviewed and am familiar with the Notice of Proposed Rule Making in Docket No. 92-9 and the First Report and

Order and Third Notice of Proposed Rule Making in that Docket which was issued on October 16, 1992.

I have participated in the preparation, review and finalization of WTCI's Reply Comments to which this Statement is attached, and I am responsible for the engineering facts and related cost computations in WTCI's Reply Comments.

I have concluded that the frequency plans and channelizations proposed by the Further Notice are unworkable and extremely costly. The most logical solution is to allow 2 GHz users to move to the 1.71-1.85 and 3.6-3.7 GHz government bands. The order of priority of frequency usage, starting with these government bands, proposed by WTCI's Reply Comments should be adopted by the Commission. If the 6 and 11 GHz common carrier bands have to be used for the displaced 2 GHz users, then the existing, industry-wide frequency plans should be retained.

The proposal to move 2 GHz users into the 4, 6 and 11 GHz common carrier bands would be extremely costly for those moving to those bands and for common carriers operating in those bands.

If the channelization plans of the Further Notice for these bands are adopted, common carriers would be required to spend at least \$60,000 per site for conversion of 6 GHz facilities, \$85,000 for 4 GHz sites and \$110,000 per site for 11 GHz facilities. (See Appendix A hereto.) Based on my knowledge of WTCI's microwave network and information supplied to me by WTCI's in-house engineering staff, I have concluded that these are the minimum costs

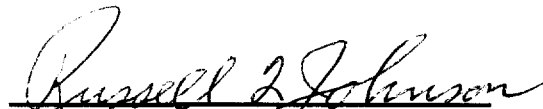
that would be incurred by WTCI for WTCI's 15 4 GHz sites, 269 6 GHz sites and 74 11 GHz sites. Thus, the total cost to WTCI alone for conversion to the proposed frequency plan would be more than \$25,000,000. There would be added costs of \$2,000 per equipment bay (2T - 2R) for retuning WTCI's spare 4 and 6 GHz radio equipment or a total cost of \$150,000, and an additional cost of \$12,000 per bay (or a total of \$480,000) for its spare 11 GHz equipment that otherwise would become worthless.

The foregoing changeout costs would be required even if all existing licenses are grandfathered in any case where additional channels are added to a route, or spurs are constructed off of the route, to avoid intrasystem interference between WTCI's existing frequency plans for the common carrier bands and those proposed by the Further Notice. The addition of a channel on one frequency plan to an existing system on another frequency plan is not feasible, because of interference into the existing frequency plan channels and vice versa (intrasystem interference). Similarly, the addition of a spur to the existing microwave system to serve additional points along the route in most instances would not be workable; there would be severe intrasystem interference except possibly in the unlikely instance where the spur off of the existing system is added on a 90 degree axis to the system. The same problem would occur on subsequent hops if there was an attempt to change frequency plans along the spur. Since frequencies are reused every other hop, the frequency offset of the new plan would interfere with the existing frequencies and cause a beat tone up to 2 MHz on the 6 GHz systems and would be completely unusable on the 11 GHz systems.

The proposal to move existing 2 GHz facilities to higher bands is also extremely costly on a per site basis and total changeover basis for all 2 GHz users. I have estimated that the cost of new microwave equipment alone for a one channel, hot standby 2 GHz site would be \$76,800, that a 35 foot free standing tower would cost \$15,000 with associated antennas of \$24,740, and that the waveguide and coordination costs would total \$8,460, for a total conversion cost of \$125,000 per 2 GHz site. (See Appendix B.)

- The total costs per 2 GHz site are based on the following assumptions:
1. Almost all existing 2 GHz towers will have to be replaced. Whereas 2 GHz systems have a beamwidth tolerance of approximately 6 degrees, allowing for a liberal amount of tower twist and sway, systems at 6 GHz have a beamwidth tolerance of 1.1 degrees and 11 GHz systems have a beamwidth tolerance of 0.7 degrees. Thus, stiffer towers will be required of the 2 GHz users to ensure proper operations due to the weight of antennas and wind loading increases caused by the use of shrouded antennas.
  2. The \$125,000 cost of converting a 2 GHz site is the minimal cost. Because of coordination difficulties, many of the 2 GHz sites will have to use more expensive antennas than can cost up to \$40,000 each. Also, many sites will require higher towers to accommodate space diversity, increasing costs up to \$100,000 for such towers. In addition, in many locations the 2 GHz site is co-located with common carrier facilities, and there will be added costs to 2 GHz users because the site will have to be abandoned and a new site or sites found that can coordinate with common carrier facilities in the area. Thus, the average cost of moving 2 GHz facilities could well exceed \$125,000 per site.

This Engineering Affidavit and attached Appendices were prepared by me or under my direction with the assistance of WTCI's in-house engineering staff.

  
Russell F. Johnson

January 26, 1993

## APPENDIX A

### WTCI RECHANNELIZATION COSTS

#### SUMMARY

4 GHz	Message	=	\$ 2,541,000.00
6 GHz	Message	=	\$12,348,468.00
6 GHz	Video	=	\$ 4,029,000.00 *
11 GHz	Message	=	\$ 2,604,600.00
11 GHz	Video	=	<u>\$ 2,710,500.00 *</u>
	<b>TOTAL</b>		<b>\$24,233,568.00</b>

#### I      4 GHz      (12 Frequencies)      Message

TX/RX Parts	\$ 67,000.00
Installation Labor	\$ 4,800.00
Travel	\$ 2,400.00
Frequency Coordination Labor	\$ 2,000.00
Outside Computer & FCC Licence	\$ 1,500.00
Engineering Documentation	\$ 2,000.00
Inter-Carrier Ops Coord.	<u>\$ 5,000.00</u>
<b>TOTAL</b>	<b>\$ 84,700.00 per simplex path</b>

#### Message Total

Cost per path direction times two times number of paths = total

\$84,700.00 X 2 X 15 = \$2,541,000.00

#### II      6 GHz      (8 Frequencies)      Message

TX/RX Parts	\$ 44,666.00
Installation Labor	\$ 4,800.00
Travel	\$ 2,400.00
Frequency Coordination Labor	\$ 2,000.00
Outside Computer & FCC License	\$ 1,500.00
Engineering Documentation	\$ 2,000.00
Inter-Carrier Ops Coordination	<u>\$ 5,000.00</u>
<b>TOTAL</b>	<b>\$ 62,366.00</b>

#### Message Total

Cost per path direction times two times number of paths = total

\$62,366.00 X 2 X 99 = \$12,348,468.00

\*      Video is simplex direction, 50% utilization.      Message is duplex, full utilization.

6 GHz            (4 Frequencies)      Video

TX/RX Parts	\$ 6,000.00
Installation Labor	\$ 4,800.00
Travel	\$ 2,400.00
Frequency Coordination Labor	\$ 2,000.00
Outside Computer & FCC License	\$ 1,500.00
Engineering Documentation	\$ 2,000.00
Inter-Carrier Ops Coordination	<u>\$ 5,000.00</u>
TOTAL	\$ 23,700.00

Video Total

Cost per path direction times number of paths = total

\$23,700 X 170 = \$4,029,000

III    11 GHz            (12 Frequencies)      Message

TX/RX Parts	\$ 67,000.00
IF Parts	\$ 60,000.00
Installation Parts	\$ 4,800.00
Travel	\$ 2,400.00
Frequency Coordination Labor	\$ 2,000.00
Outside Computer & FCC License	\$ 1,500.00
Engineering Documentation	\$ 2,000.00
Inter-Carrier Ops Coordination	<u>\$ 5,000.00</u>
TOTAL	\$ 144,700.00

Message Total

Cost per path direction times two times number of paths = total

\$144,700.00 X 2 X 9 = \$2,604,600.00

11 GHz            (6 Frequencies)      Video

TX/RX Parts	\$ 4,000.00
IF Parts	\$ 20,000.00
Installation Labor	\$ 4,800.00
Travel	\$ 2,400.00
Frequency Coordination Labor	\$ 2,000.00
Outside Computer & FCC License	\$ 1,500.00
Engineering Documentation	\$ 2,000.00
Inter-Carrier Ops Coordination	<u>\$ 5,000.00</u>
TOTAL	\$ 41,700.00

Video Total

Cost per path direction times number of paths = total

\$41,700.00 X 65 = \$2,710,500.00

## APPENDIX B

### TYPICAL 2 GHz BAND MIGRATION COST ABOVE 3 GHz

Radio Equipment	\$	76,800
Waveguide Components	\$	3,460
2 Antennas (Standard A)	\$	24,740
Frequency Coordination	\$	5,000
Tower Cost	\$	<u>15,000</u>
TOTAL	\$	125,000

These costs represent relocation to the upper frequency bands only. Assumes existing station will frequency coordinate and will not require relocation. If the existing tower can be modified and not replaced, the overall cost of a tower study and the tower modification would approximate the cost of the assumed 35 foot new tower. The labor costs are not included in the respective items.



## RECOMMENDATION

**Subject Area:** Notification-Response Procedures

**Title:** Coordination for Future Plans

Section 21.100(d)(11) of the FCC Rules requires coordinators to distribute six-month renewal notices in order to assure continued coordination protection in cases in which no related FCC application has been filed. The Rules also state, in Section 21.100(d), that "Applicants should make every reasonable effort to avoid blocking the growth of systems that are likely to need additional capacity in the foreseeable future." (Note that the limit on the protection of future plans is generally considered to be 10 years).

To avoid any confusion, we believe that six-month renewals are necessary for continuing protection of all future construction plans, including new stations, new uses of frequency bands, new directions of transmission, and any equipment or service modifications which might have an effect on the interference/coordination environment.

One exception to this guideline may be made, and regular six-month renewals would not be necessary under the following conditions:

1. The coordination protection requested involves additional (growth) channels in an existing system;
2. The growth channel parameters, with the obvious exception of channel frequency, are identical to at least one channel licensed and operating on the same path;
3. Absent reasonable justification for doing otherwise, each growth channel should be associated with a specific channel loading. (Note that if there are several licensed channels with multiple loadings, growth channels with different individual loadings may be protected, providing they are each assigned a particular loading.);
4. The coordinator desiring continuing protection (without regular six-month renewals) must have included the specific growth channels in at least one previous PCN;
5. Within six months prior to filing an FCC application to activate a growth channel, an advisory notification should be sent to all other affected coordinators; and
6. If a coordinator drops interest in a growth channel, an advisory notice should be promptly distributed to other affected coordinators.

## CERTIFICATE OF SERVICE

I, Nancy E. Davies, a secretary in the law offices of Haley, Bader & Potts, hereby certify that the foregoing "Reply Comments of Western Telecommunications, Inc." were mailed this date by First Class U.S. Mail, postage prepaid, or were hand-delivered\*, to the following:

Dr. Thomas P. Stanley, Chief\*  
Office of Engineering and  
Technology  
Federal Communications  
Commission  
2025 M Street, N.W.  
Room 7002  
Washington, D.C. 20554

Ms. Cheryl A. Tritt, Chief\*  
Common Carrier Bureau  
Federal Communications  
Commission  
1919 M Street, N.W.  
Room 500  
Washington, D.C. 20554

Mr. Thomas S. Tycz\*  
Domestic Facilities Division  
Federal Communications  
Commission  
2025 M Street, N.W.  
Room 6010  
Washington, D.C. 20554

Mr. Ralph A. Haller, Chief\*  
Private Radio Bureau  
Federal Communications  
Commission  
2025 M Street, N.W.  
Room 5002  
Washington, D.C. 20554

Commissioner James H. Quello\*  
Federal Communications  
Commission  
1919 M Street, N.W.  
Room 802  
Washington, D.C. 20554

Commissioner Sherrie P. Marshall\*  
Federal Communications  
Commission  
1919 M Street, N.W.  
Room 826  
Washington, D.C. 20554

Commissioner Andrew C. Barrett\*  
Federal Communications  
Commission  
1919 M Street, N.W.  
Room 844  
Washington, D.C. 20554

Commissioner Ervin S. Duggan\*  
Federal Communications  
Commission  
1919 M Street, N.W.  
Room 832  
Washington, D.C. 20554

Jeffrey L. Sheldon, Esquire  
Sean A. Stokes, Esquire  
Utilities Telecommunications  
Council  
1140 Connecticut Avenue, N.W.  
Suite 1140  
Washington, D.C. 20036

Mr. Alexander P. Humphrey  
GE American Communications, Inc.  
1331 Pennsylvania Ave., N.W.  
Washington, D.C. 20004

Larry A. Blosser, Esquire  
MCI Telecommunications  
Corporation  
1801 Pennsylvania Ave., N.W.  
Washington, D.C. 20006

David P. Condit, Esquire  
American Telephone and Telegraph  
Company  
295 North Maple Avenue  
Room 3244J1  
Basking Ridge, New Jersey 07920

Mr. Christopher R. Hardy  
Manager, Transmission Planning  
Services  
Comsearch  
11720 Sunrise Valley Dr.  
Reston, VA 22091

William L. Roughton, Jr., Esq.  
The Bell Atlantic Companies  
1710 H Street, N.W.  
Washington, D.C. 20006

Margaret deB. Brown, Esq.  
Pacific Telesis Group  
130 Kearny Street  
Room 3659  
San Francisco, CA 94108

William S. Reyner, Esq.  
Hogan & Hartson  
555 Thirteenth Street, N.W.  
Washington, D.C. 20004  
Counsel for MRC  
Telecommunications, Inc.

Mr. Sambran Sandoval  
President  
National Spectrum Managers  
Assoc., Inc.  
Post Office Box 8378  
Denver, CO 80201

Daniel L. Bart, Esq.  
GTE Service Corporation  
1850 M Street, N.W.  
Suite 1200  
Washington, D.C. 20036

John P. Janka, Esq.  
Latham & Watkins  
1001 Pennsylvania Ave., N.W.  
Suite 1300  
Washington, D.C. 20004  
Counsel for Hughes  
Communications Galaxy, Inc.

Henry L. Baumann, Esq.  
Exec. Vice Pres. & Gen. Counsel  
National Association of  
Broadcasters  
1771 N Street, N.W.  
Washington, D.C. 20036

Mr. Peter J. Loewenstein  
Vice Pres. for Distribution  
National Public Radio, Inc.  
2025 M Street, N.W.  
Washington, D.C. 20036

Mr. Edward E. Reinhart  
Chairman, SBCA Technical Comm.  
Satellite Broadcasting and  
Communications Association  
225 Reinekers Lane  
Suite 600  
Alexandria, VA 22314

Benjamin J. Griffin, Esq.  
Reed, Smith, Shaw & McClay  
1200 18th Street, N.W.  
Washington, D.C. 20036  
Counsel for Home Box Office

Stephen L. Goodman, Esq.  
Halprin & Goodman  
Suite 1020, East Tower  
1301 K Street, N.W.  
Washington, D.C. 20005  
Counsel for Northern Telecom  
Inc.

Mr. Eric Schimmel  
Vice-President  
Telecommunications Industry  
Association  
2001 Pennsylvania Ave., N.W.  
Suite 800  
Washington, D.C. 20006-1813

Mr. Michael D. Kennedy  
Director, Regulatory Relations  
Motorola Inc.  
1350 I Street, N.W.  
Suite 400  
Washington, D.C. 20005

George Petrutsas, Esq.  
Fletcher, Heald & Hildreth  
1225 Connecticut Ave., N.W.  
Suite 400  
Washington, D.C. 20036-2679  
Counsel for Harris Corp.-  
Farinon Division, Digital  
Microwave Corp., and  
Telesciences, Inc.  
(Joint Comments)

Peter Tannenwald, Esq.  
Arent, Fox, Kintner, Plotkin &  
Kahn  
1050 Connecticut Ave., N.W.  
Washington, D.C. 20036-5339  
Counsel for Public Broadcasting  
Service

Robert J. Miller, Esq.  
Gardere & Wynne, L.L.P.  
1601 Elm Street  
Suite 3000  
Dallas, Texas 75201  
Counsel for Alcatel Network  
Systems, Inc.

Kurt A. Wimmer, Esq.  
Covington & Burling  
1201 Pennsylvania Ave., N.W.  
Post Office Box 7566  
Washington, D.C. 20044  
Counsel for American Personal  
Communications

Thomas J. Keller, Esq.  
Verner, Liipfert, Bernhard,  
McPherson and Hand  
901 15th Street, N.W.  
Suite 700  
Washington, D.C. 20005  
Counsel for Lower Colorado  
River Authority

Stuart F. Feldstein, Esq.  
Fleischman and Walsh  
1400 Sixteenth Street, N.W.  
Washington, D.C. 20036  
Counsel for Associated PCN  
Company and Associated  
Communications of Los Angeles

Thomas J. Keller, Esq.  
Verner, Liipfert, Bernhard,  
McPherson and Hand  
901 15th Street, N.W.  
Suite 700  
Washington, D.C. 20005  
Counsel for Association of  
American Railroads

Wayne V. Black, Esq.  
Keller and Heckman  
1001 G Street, N.W.  
Suite 500 West  
Washington, D.C. 20001  
Counsel for American Petroleum  
Institute

Mr. Michael J. Morris  
Vice President  
SR. Telecom, Inc.  
8150 Trans-Canada Highway  
St. Laurent, Quebec  
Canada H4S 1M5

A handwritten signature in cursive script, reading "Nancy E. Davies". The signature is written in dark ink and is positioned above a horizontal line.

---

Nancy E. Davies

January 27, 1993